A View-Dependent Metric for Patch-Based LOD Generation & Selection

Supplemental Material

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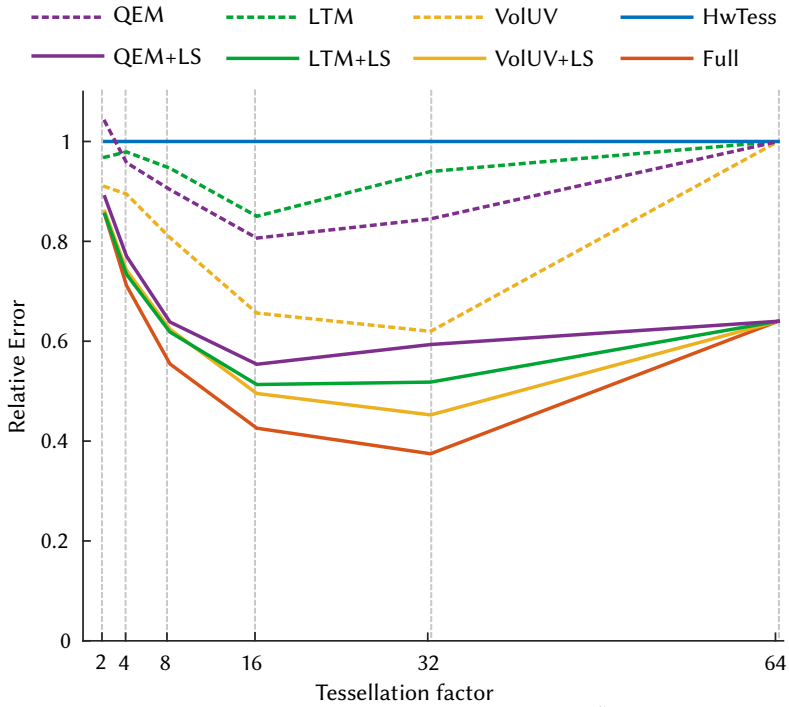
1 NUMERICAL COMPARISON

Measuring with our anisotropic metric **(a)** and the Hausdorff distance **(b)**, we compare the QEM- and LTM-based vertex placement strategies with our new Volumetric UV optimization with and without least-square refitting, and eventually its *full* combination with our novel edge selection cost. In both cases, the error is expressed relatively to the mesh produced by the regular hardware tessellation (HwTess) and averaged over all patches of the four 3D models shown in Section 3.



(a) Measured with our anisotropic metric $\tilde{E}$

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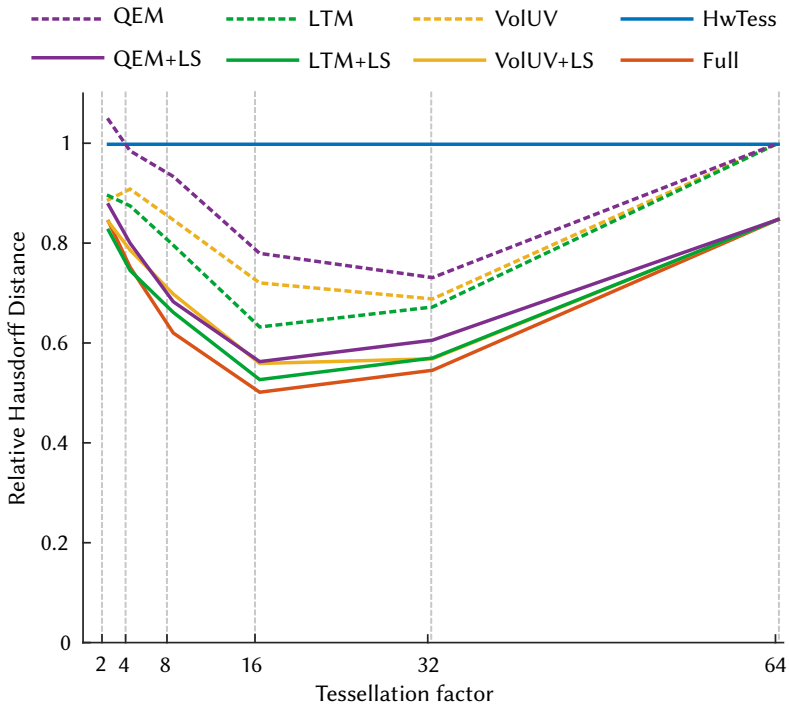


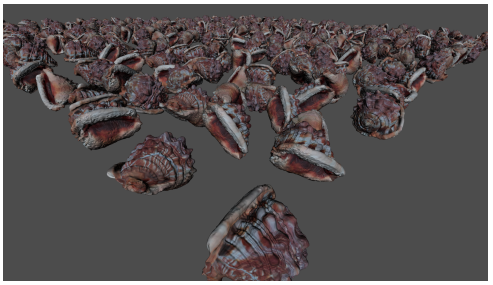
(b) Measured with the Hausdorff distance

2 SUBJECTIVE EVALUATION

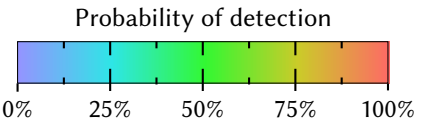
We compare our selection metric and generation algorithm with the perception-correlated image quality metric HDR-VDP-2 [Mantiuk et al. 2011], using the default parameters of the online tool (http://driiqm.mpi-inf.mpg.de):

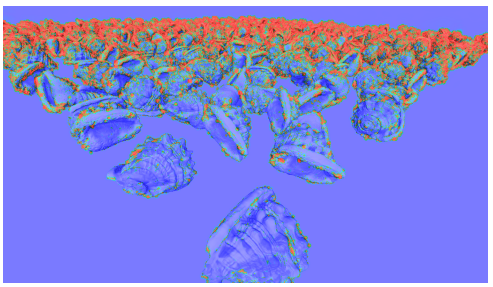
- display diagonal size: 24 inches
- display resolution: 1920 × 1200 pixels
- viewing distance: 0.5 m
- color encoding: sRGB

We also show the root Mean Square Error (RMSE) and Structural Similarity Index (SSIM) [Wang et al. 2004].

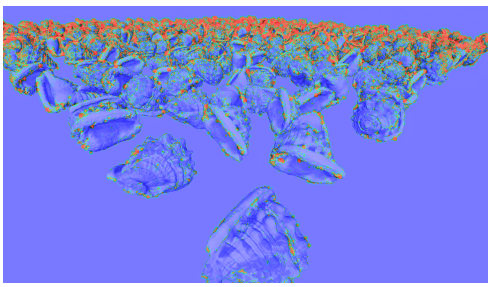


Reference (535M tris)

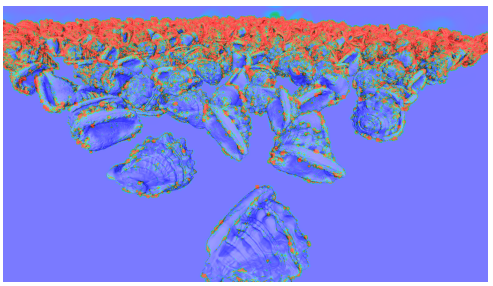




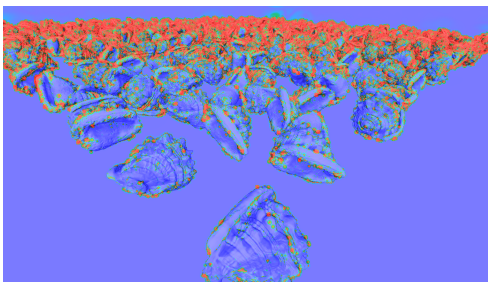
(a) Our + Hausdorff (6M tris)
$Q = 60.68$
RMSE = 4.244 – SSIM = 0.975



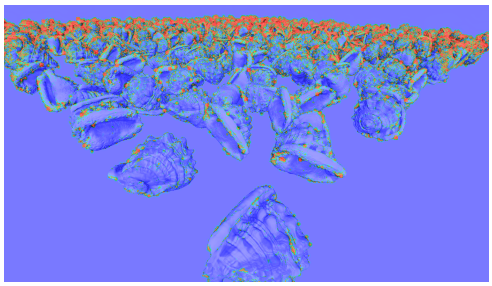
(b) Our + $\tilde{E}$ (13M tris)
$Q = 66.08$
MSE = 2.904 – SSIM = 0.985

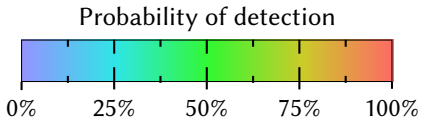


(c) QEM + $\tilde{E}$ (13M tris)
$Q = 60.71$
RMSE = 4.342 – SSIM = 0.973

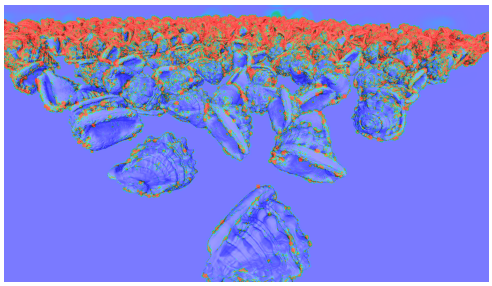


(d) HwTess + $\tilde{E}$ (13M tris)
$Q = 62.27$
RMSE = 4.127 – SSIM = 0.974

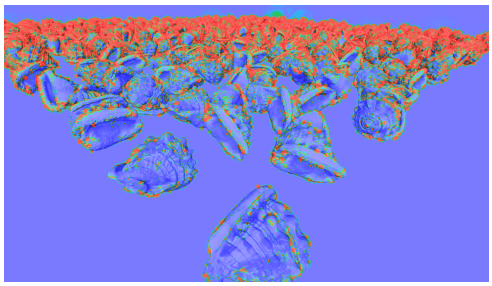




(e) Our + E_{iso} (13M tris)
Q = 65.53
RMSE = 2.954 – SSIM = 0.984



(f) QEM + E_{iso} (13M tris)
Q = 60.19
RMSE = 4.460 – SSIM = 0.973

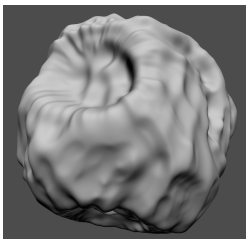


(g) HwTess + E_{iso} (13M tris)
Q = 60.21
RMSE = 4.287 – SSIM = 0.974

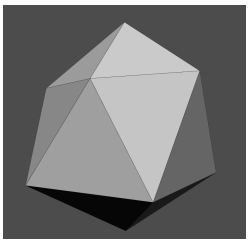
3 LOD COMPARISON

For 4 test scenes, we visually compare the meshes generated at levels 16, 8 and 4 by the QEM variant of Lambert et al. [2016] and our method.

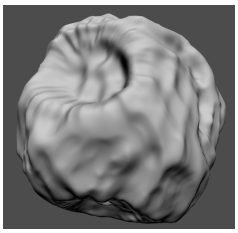
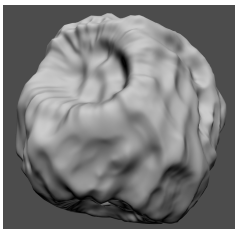
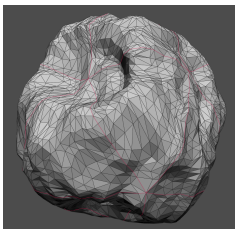
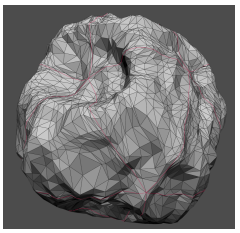
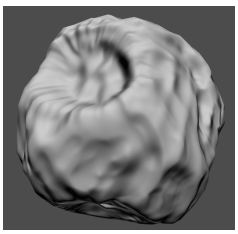
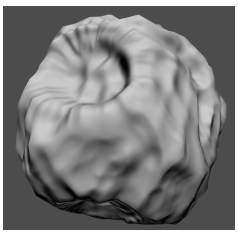
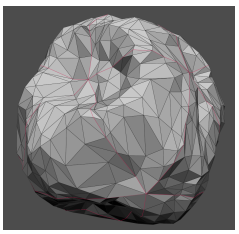
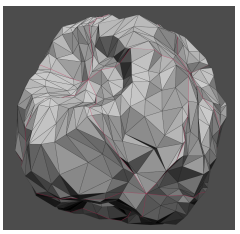
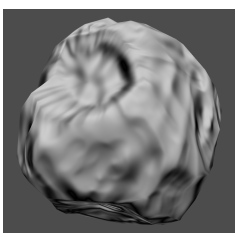
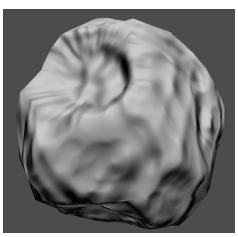
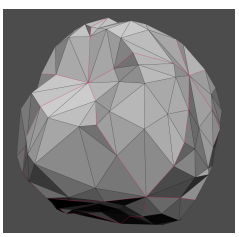
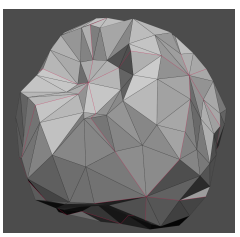
3.1 Asteroid



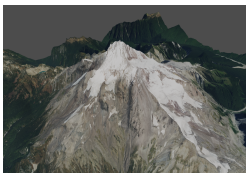
Reference mesh



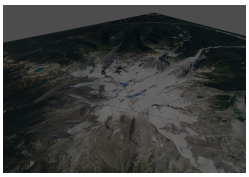
Coarse mesh

	QEM	Our	QEM	Our
16				
8				
4				

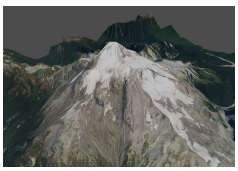
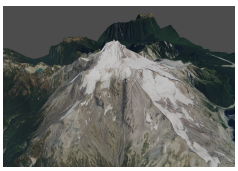
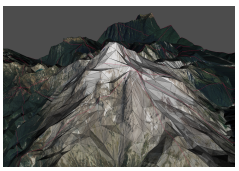
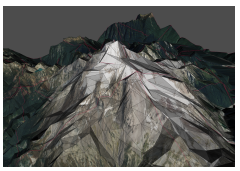
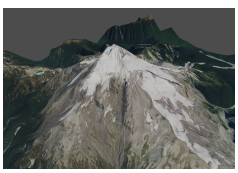
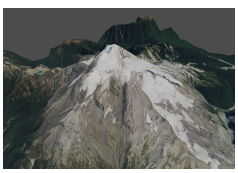
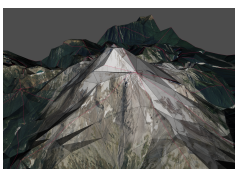
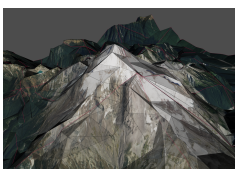
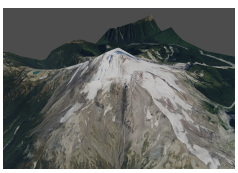
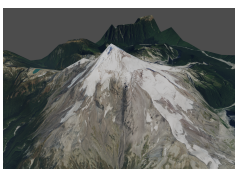
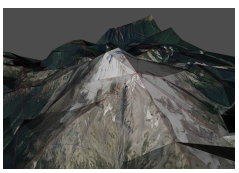
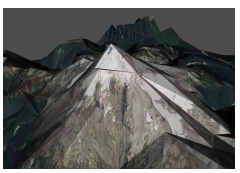
3.2 Glacier Peak



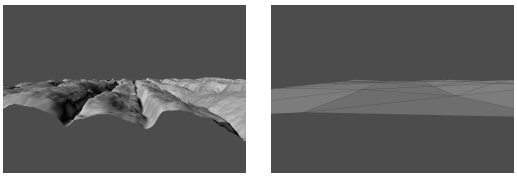
Reference mesh



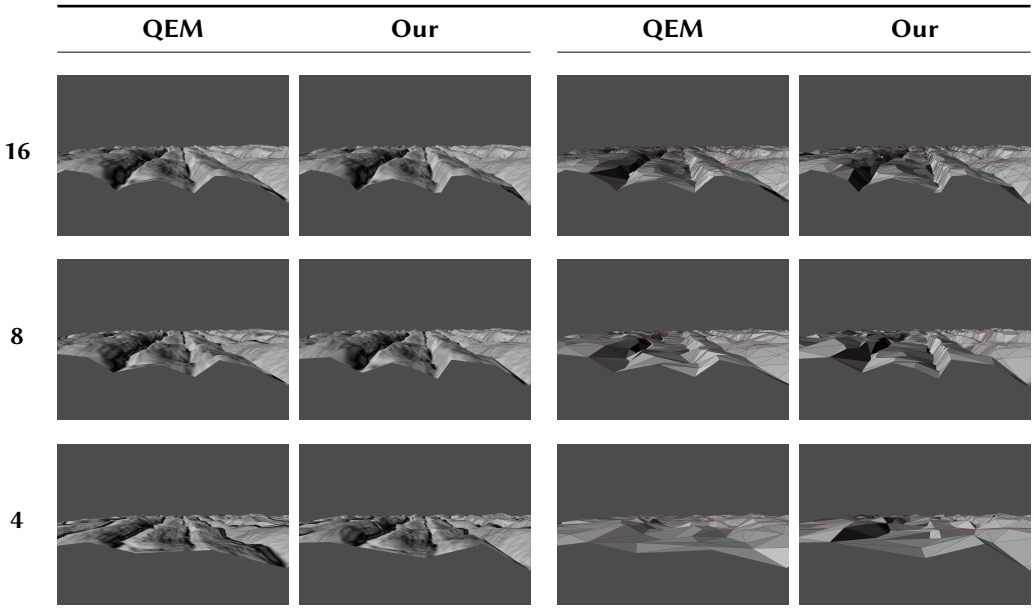
Coarse mesh

	QEM	Our	QEM	Our
16				
8				
4				

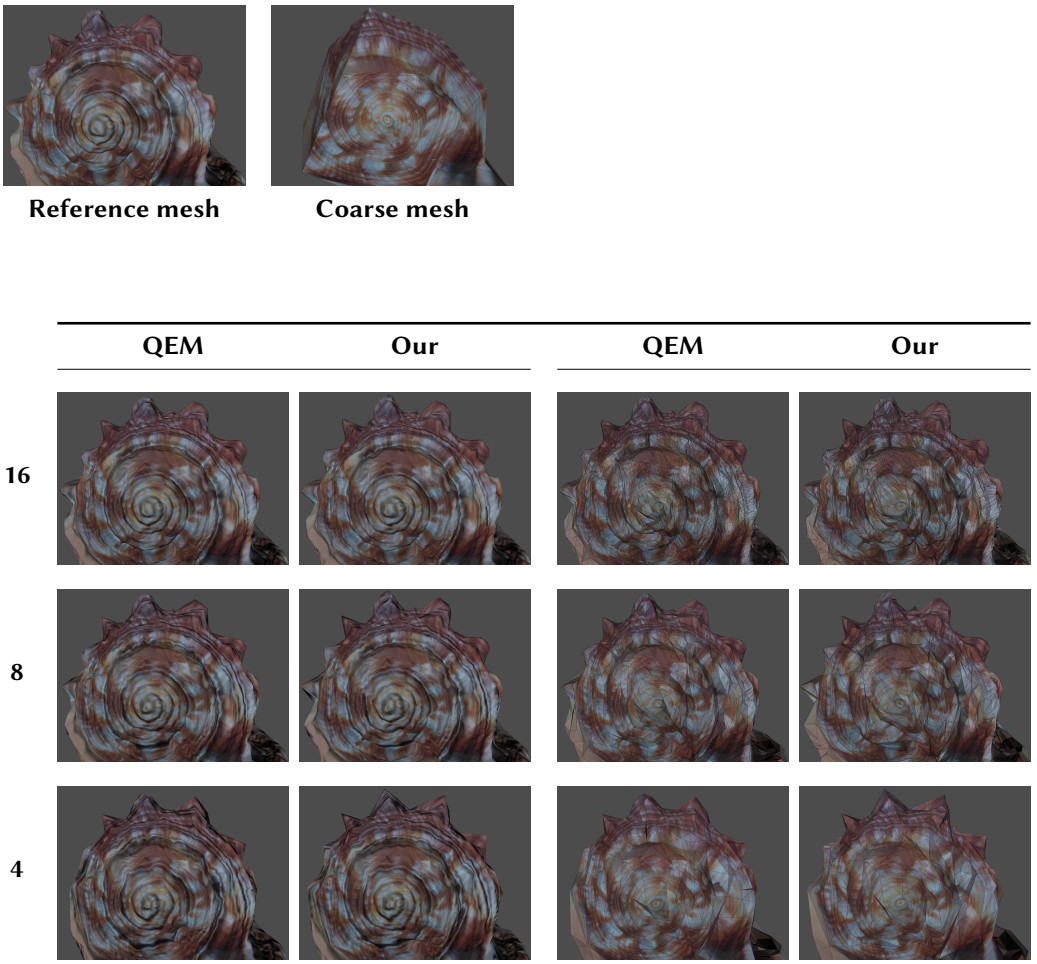
3.3 Bricks



Reference mesh Coarse mesh



3.4 Seashell



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Rafat Mantiuk, Kil Joong Kim, Allan G. Rempel, and Wolfgang Heidrich. 2011. HDR-VDP-2: A Calibrated Visual Metric for Visibility and Quality Predictions in All Luminance Conditions. *ACM Transactions on Graphics* 30, 4 (2011), 40:1–40:14.

Zhou Wang, A. C. Bovik, H. R. Sheikh, and E. P. Simoncelli. 2004. Image quality assessment: from error visibility to structural similarity. *IEEE Transactions on Image Processing* 13, 4 (2004), 600–612. https://doi.org/10.1109/TIP.2003.819861